

The beginning (preservice) elementary teacher will demonstrate knowledge of and/or competency in the following areas of study:

<p>1: Unifying Concepts and Processes The beginning teacher of science is familiar with, and teaches, the major concepts and principles that unify all scientific effort and that are used in each of the science disciplines (1997 SSC: 1.2; CR GenEd; ACEI: Standard 2b; NSTA [2001]: Standard 1; NSTA [1998], Standard 1; NSES: UCP-1-5)</p>	<p>1.1. systems, order, and organization; 1.2 evidence, models, and explanation; 1.3 change, constancy, and measurement; 1.4 evolution and equilibrium; and 1.5 form and function.</p>
<p>2: Science As Inquiry The beginning teacher of science understands and practices the science inquiry process. (1997 SSC: 1.1, 1.4; CR GenEd; ACEI: Standard 2b; NSTA [2001]: Standard 3, 9; NSTA [1998], Standard 3, 9; NSES: E-A1, A2; S 1, 2, 7-8¹; ETS 0011: III.3-4)</p>	<p>2.1 identify questions that can be answered through scientific investigations. 2.2 design and conduct a scientific investigation, including general abilities, such as recognition of the principal elements in an experimental design (i.e., the hypothesis, independent and dependent variables, and controls); systematic observation, making accurate measurements, and identifying and controlling variables; clarifying ideas that are influencing and guiding the inquiry; and comparing ideas with current scientific knowledge 2.3 use appropriate tools (e.g., hand tools, measuring instruments, calculators, and computers for the collection, summary, and display of evidence), techniques, and mathematics to gather, analyze, and interpret data, including selecting the scientific apparatus or instrument appropriate to a specified laboratory or field task and identifying proper operation of such equipment; using the metric system of measurement, recognizing equivalents within that system and selecting units appropriate to a given laboratory or field task; converting between scientific notation and conventional numerals and using scientific notation to perform calculations. 2.4 develop descriptions, explanations, predictions, and models using evidence based on observation and the abilities to differentiate explanation from description, to provide causes for effects, and to establish relationships based on evidence and logical argument and connections between the content of science and the contexts within which new knowledge is developing. 2.5 think critically and logically about relationships between evidence and explanations, including the ability to interpret and express the results of observation and experimentation. 2.6 recognize, construct, and analyze alternative explanations, including the abilities to identify accurate verbal, graphic, and tabular expressions of data derived from observation and experimentation; draw conclusions and make inferences from observations or experimental results presented in verbal,</p>

	<p>graphic, or tabular form; and describe a scientific relationship in symbolic mathematical terms.</p> <p>2.7 communicate scientific arguments and explanations.</p> <p>2.8 use mathematics in all aspects of scientific inquiry to ask questions; to gather, organize, and present data; and to structure convincing explanations.</p> <p>2.9 handle, label, store, and dispose of chemicals, electrical equipment, and scientific apparatuses and take actions to prevent or report an emergencies, including, but not limited to, general first aid as it relates to incidents in the science classroom or laboratory. (NSTA 9.b)</p> <p>2.10 understand liability and negligence, especially as applied to science teaching and take action to prevent potential problems. (NSTA 9.c)</p>
<p>3: Physical Science: The beginning teacher of science understands the central concepts, tools of inquiry, and structures of the physical sciences and makes these aspects of subject matter meaningful for students.</p> <p>(1997 SSC: 2.1, 2.4, 2.5, 2.6, 3.1-3.6; CR GenEd; ACEI: Standard 2b ; NSTA [2001]: Rationale; Standard 1; NSTA [1998], Standard 1; NSES: E-B1, B2, B3; S 1, 2, 7-8; S 1, 2, 7-8; ETS 0011: III.1-2)</p>	<p>3.1 Properties of Objects and Materials (1997 SSC: 2.1, 2.4, 2.5; NSES: E-B1)</p> <p>3.2 Position and Motion of Objects (1997 SSC: 3.1, 3.2, 3.3, 3.5, 3.6; NSES: E-B2)</p> <p>3.3 Light, Heat, Electricity, and Magnetism (1997 SSC: 2.6, 3.4; NSES: E-B3)</p>
<p>4: Life Science: The beginning teacher of science understands the central concepts, tools of inquiry, and structures of the life sciences and makes these aspects of subject matter meaningful for students.</p> <p>(1997 SSC: 4.1-7, 5.1, 5.2-6; CR GenEd; ACEI: Standard 2b ; NSTA [2001]: Rationale; Standard 1; NSTA [1998], Standard 1; NSES: E-C1, C2, C3; S 3, 4, 7-8)</p>	<p>4.1 Characteristics of Organisms (1997 SSC: 4.2, 4.4, 4.7, 5.1; NSES: E-C1)</p> <p>4.2 Life Cycles of Organisms (1997 SSC: 4.2, 5.2; NSES: E-C2)</p> <p>4.3 Organisms and Environments (1997 SSC: 4.1, 4.4, 4.5, 4.7, 5.1, 5.2, 5.4-6; NSES: E-C3)</p> <p>4.4 Regulation and Behavior (1997 SSC: 4.3-7)</p>
<p>5: Earth and Space Science: The beginning teacher of science understands the central concepts, tools of inquiry, and structures of the earth and space sciences and makes these aspects of subject matter meaningful for students.</p> <p>(1997 SSC: 6.1-3, 6.5-7, 7.1-3; CR GenEd; ACEI: Standard 2b ; NSTA [2001]: Rationale; Standard 1; NSTA [1998], Standard 1; NSES: E-D1, D2, D3; S 5-8; ETS 0011: III.2)</p>	<p>5.1 Properties of Earth Materials (1997 SSC: 6.1-3, 6.5-6; NSES: D1)</p> <p>5.2 Objects in the Sky (1997 SSC: 7.1, 7.3; NSES: D2)</p> <p>5.3 Changes in Earth and Sky (1997 SSC: 6.6, 6.7, 7.1-3; NSES: D3)</p>

<p>6: Science and Technology: The beginning teacher of science understands the relationship between science and technology, can distinguish between natural objects and objects made by humans, and makes these aspects of subject matter meaningful for students by creating experiences in making models of useful things and by developing students' abilities to identify and communicate a problem and to design, implement, and evaluate a solution.</p> <p>(1997 SSC: 1.3, 1.4; CR GenEd; ACEI: Standard 2b ; NSTA [2001], Standards 4, 5.d; NSTA [1998] Standards 2, 4, 5; NSES: E-E1, E2, E3; S 8; ETS 0011: III.1-2)</p>	<p>6.1 distinguish between natural objects and objects made by humans (NSES: E-E3)</p> <p>6.2 use a variety of technologies to model scientific phenomena (NSES: E-E2)</p> <p>6.3 identify and organize materials and other resources, choose suitable tools and techniques, and work with appropriate measurement methods to ensure adequate accuracy in the implementation of a proposed design. (NSES: E-E1 & E2)</p> <p>6.4 analyze and interpret data obtained from an experiment or investigation, including graphical data, and identify and demonstrate an understanding of sources of error in data that is presented (NSES: E-E1 & E2)</p> <p>6.5 demonstrate understanding of scientific measurement and notation systems (NSES: E-E2)</p> <p>6.6 collaborate as a team-member in the identification, communication, and resolution of scientific and technological problems. (NSES: E-E2)</p>
<p>7: Science in Personal and Social Perspectives: The beginning teacher of science understands the context of science (i.e., relationships among systems of human endeavor including science and technology; relationships among scientific, technological, personal, social and cultural values; and the relevance and importance of science to the personal lives of students) and the social context of science teaching (i.e., the social and community support network within which science teaching and learning occur; relationship of science teaching and learning to the needs and values of the community; and involvement of people and institutions from the community in the teaching of science) and uses this knowledge to enrich the science learning of all students.</p> <p>(1997 SSC: 1.3, 4.3, 4.6, 5.1, 5.4-.6, 6.1; CR GenEd; ACEI: Standard 2b ; NSTA [2001]: Standards 4, 7; NSTA [1998], Standards 4, 7; NSES: E-F1, F2, F3, F4, F5; S 1, 3-5; ETS 0011: III.4)</p>	<p>7.1 Personal Health (1997 SSC: 4.3, 4.6; NSES: E-F1)</p> <p>7.2 Characteristics and Changes in Populations (1997 SSC: 5.1, 5.4-.6; NSES: E-F2)</p> <p>7.3 Types of Resources (1997 SSC: 6.1; NSES: E-F3)</p> <p>7.4 Changes in Environments (1997 SSC: 5.1, 5.6; NSES: E-F4)</p> <p>7.5 Science and Technology in Local Challenges (1997 SSC: 1.3; NSES: E-F5)</p>
<p>8: History and Nature of Science: The beginning teacher of science understands the history and nature of science as a human endeavor and uses this knowledge to make subject matter meaningful for students.</p> <p>(1997 SSC: 1.2, 1.5-.6; ACEI: Standard 2b ; NSTA [2001]: Standard 2.a & 2.b,</p>	<p>8.1 Science as a Human Endeavor (1997 SSC: 1.2, 1.5, 1.6; NSES: E-G1)</p>

4; Standard 7; NSTA [1998], Standard 2.d, 4.b; NSES: E-G1; S 1-8)	
--	--